

# Hair Loss 2009

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CCRMC

Patient is losing her hair and is  
very distraught over balding.

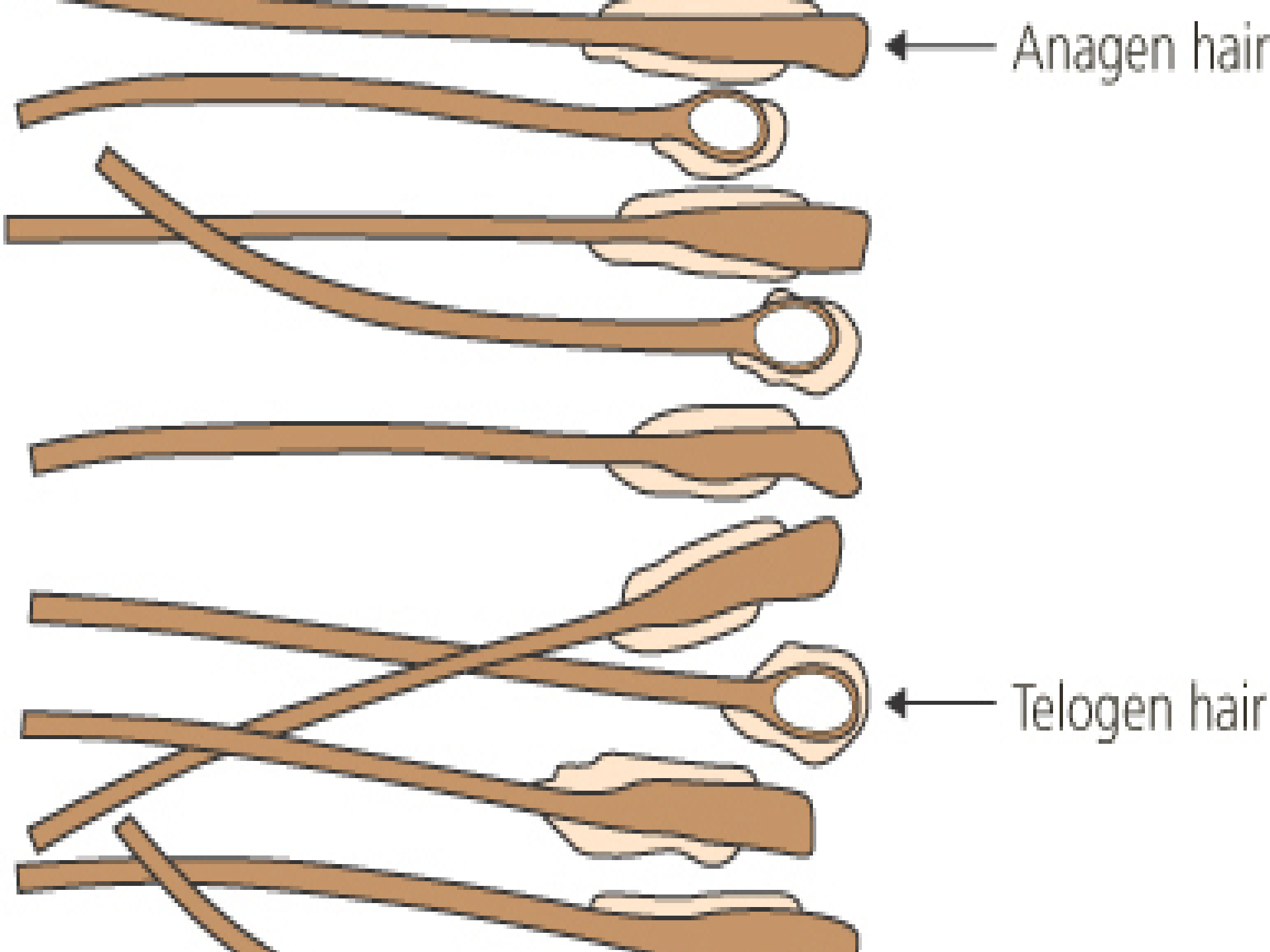




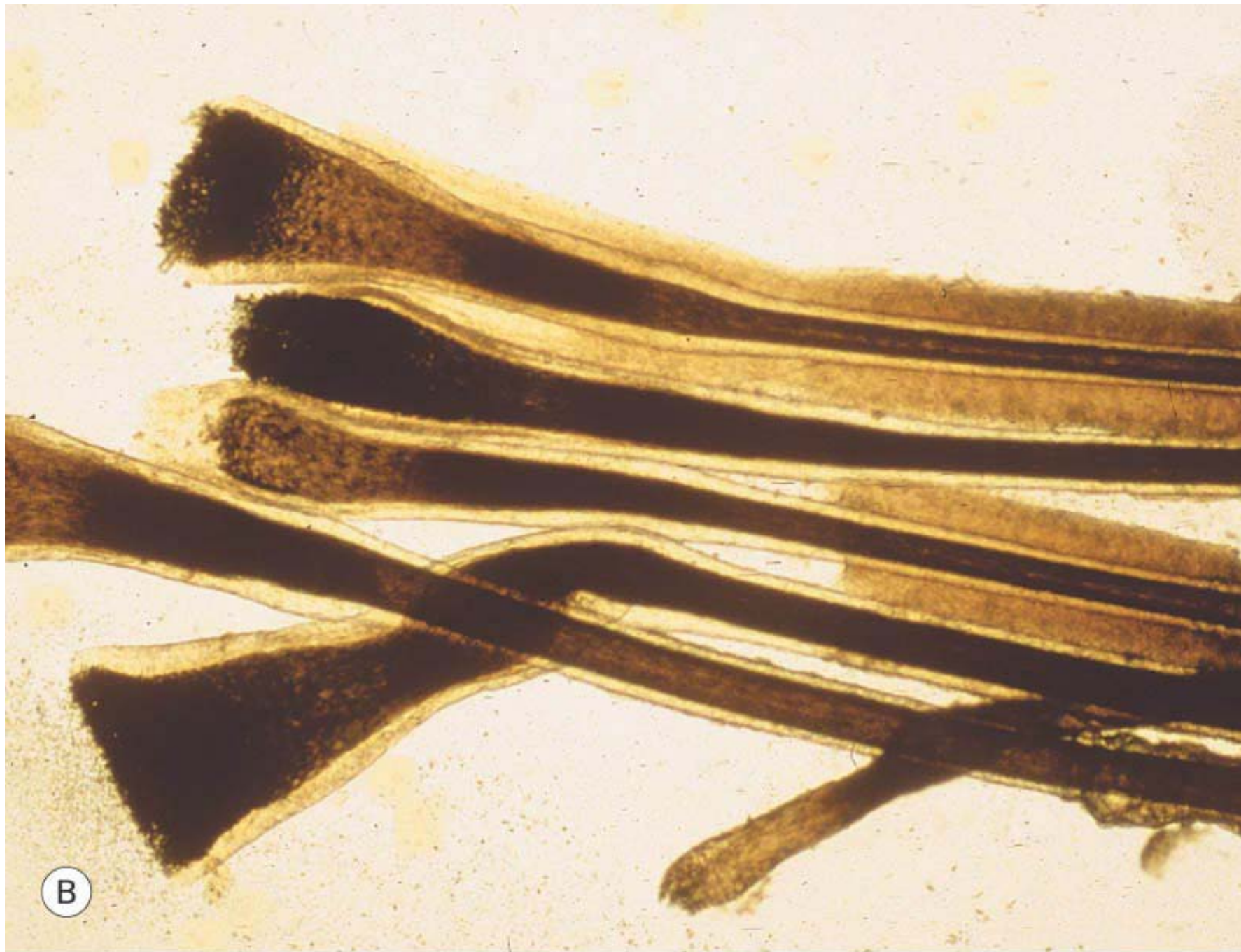


# Diffuse Hair Loss

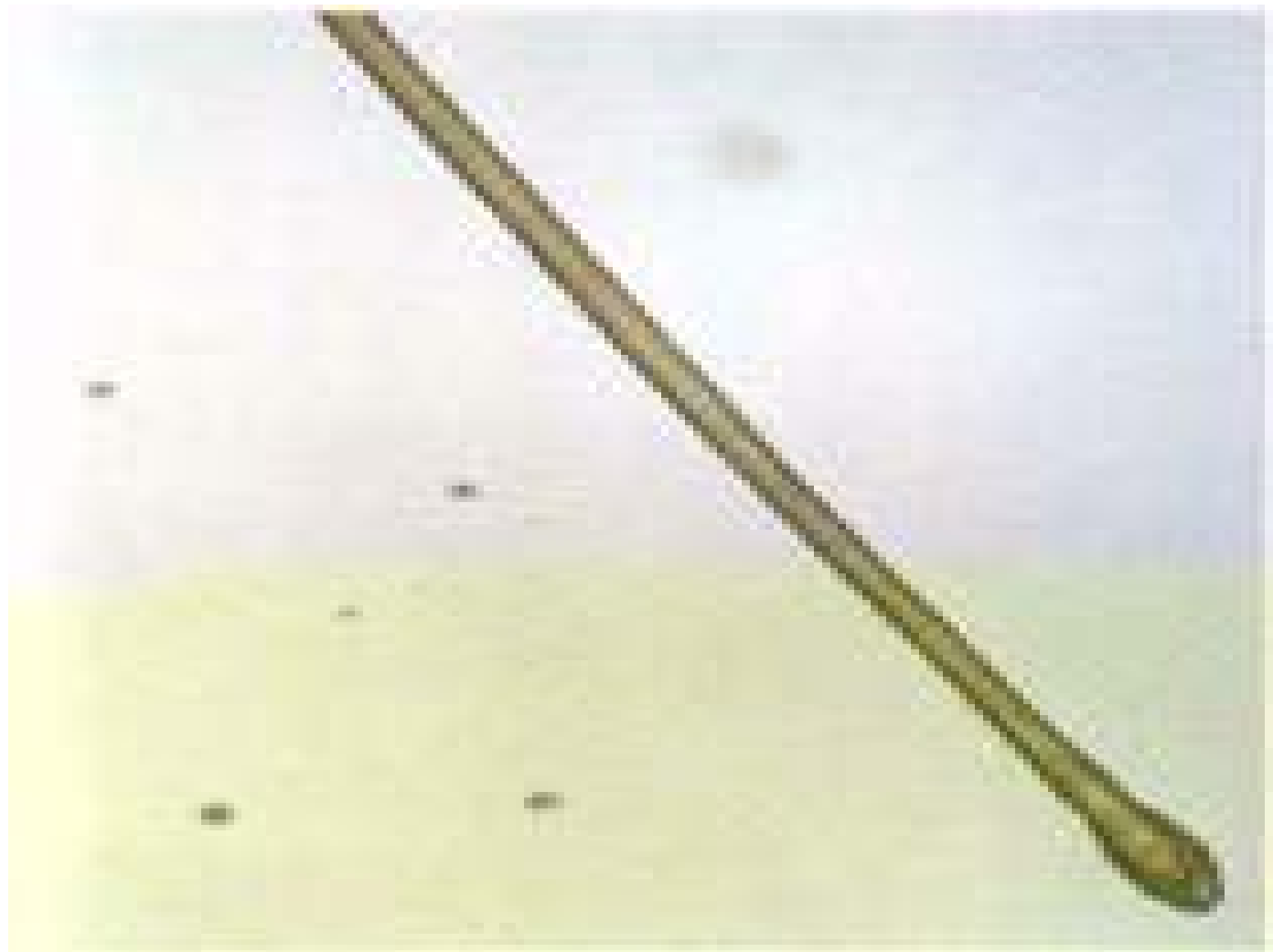
- What next???
  - 1. DO A SCALP BIOPSY
  - 2. PRESCRIBE MINOXIDIL
  - 3. DO A SCALP FUNGAL CULTURE
  - 4. DO A PULL TEST







(Courtesy of Julie V Schaffer MD.)







# Diagnosis Is ??????

- 1. Anagen alopecia
- 2. Catagen alopecia
- 3. Stress hair loss
- 4. Telogen effluvium



# What Next ???

- 1. Prescribe minoxidil
- 2. Take a history
- 3. Place patient on Yasmin OCs
- 4. Do hormone workup with appropriate lab tests
- 5. Refer to dermatology

Of the following choices, which one(s) is/are most pertinent to telogen effluvium?

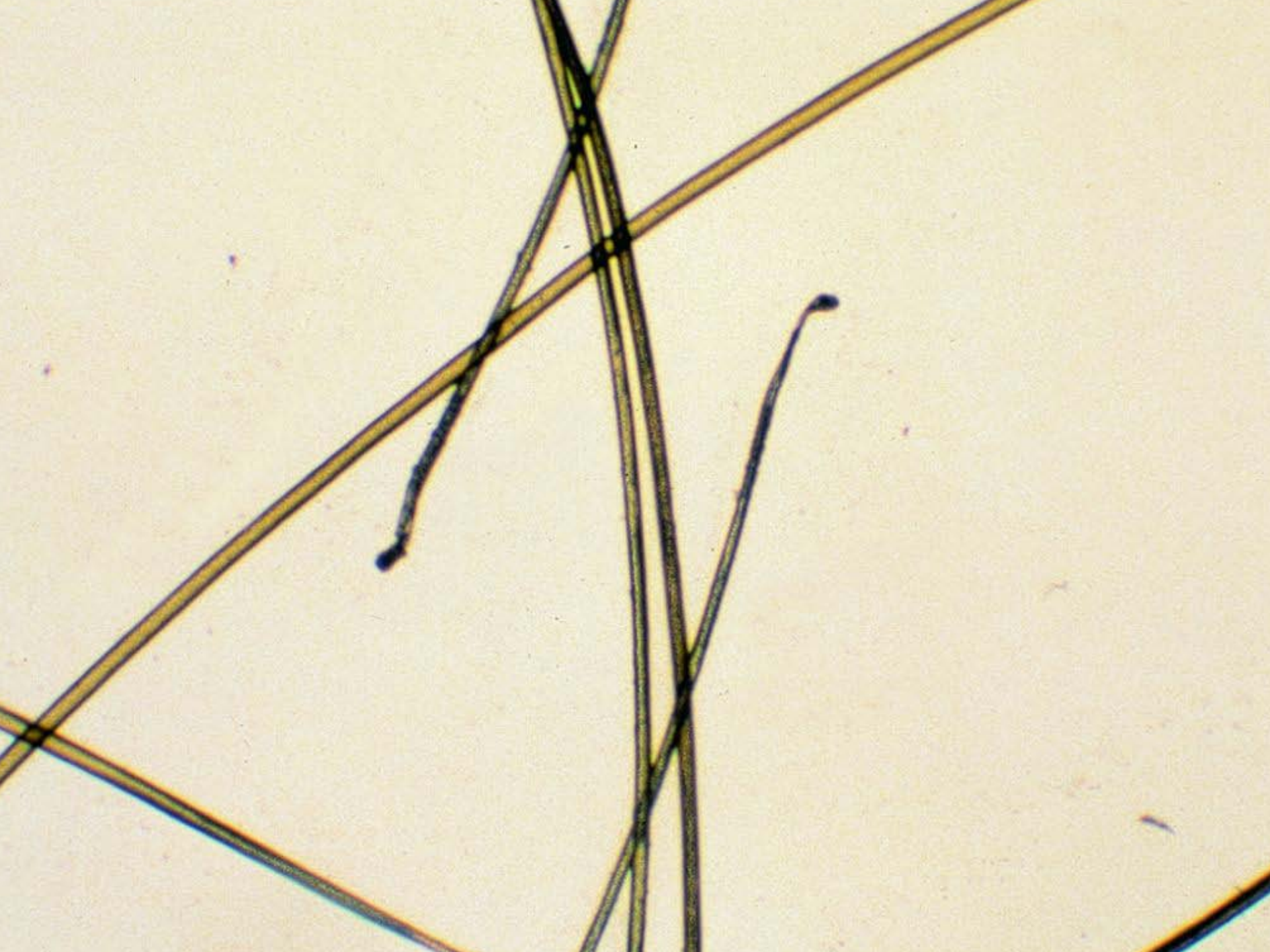
- a. Has a 3 week old baby
- b. Gained 30 pounds in the past 3 months
- c. History of thyroid disease
- d. A and C
- e. All the above



Next Patient On Your Schedule  
Is A Child With Unruly Hair











# Your Working Diagnosis Is??

- a. Breakage from a hair shaft abnormality
- b. Alopecia areata
- c. Trichotillomania
- d. A and C
- e. None of the above



# Correct diagnosis is

- Loose anagen hair loss
- Classic patient is a girl aged 2-5 with blonde hair
  - Can also see in boys, adults, and dark-haired individuals
- Children affected are healthy with normal growth and development
- Often misdiagnosed as alopecia areata or trichotillomania





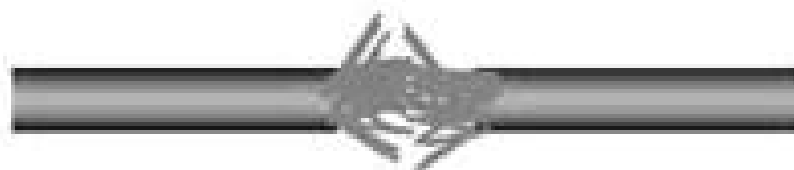


# New Patient

- Hair mount from a pull test shows the following under the microscope.



Figure 2







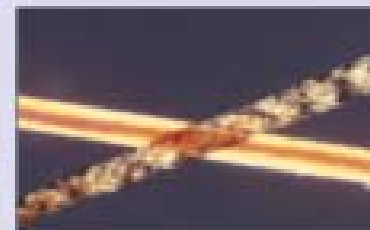
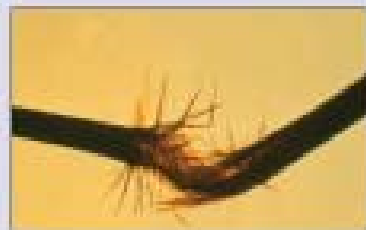
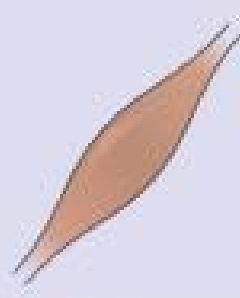
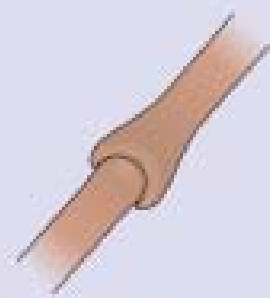
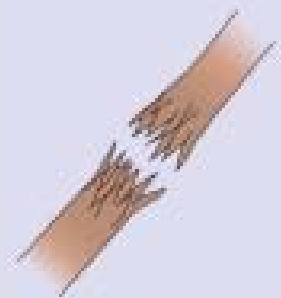


# Your diagnosis is ??

- a. Monelithrix
- b. Trichorrhexsis invaginata
- c. Pediculosis capitis
- d. Trichorrhexsis nodosum
- e. None of the above







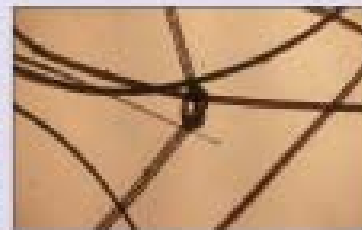
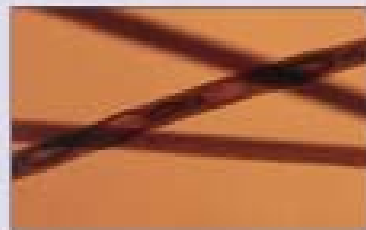
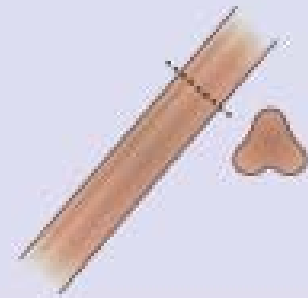
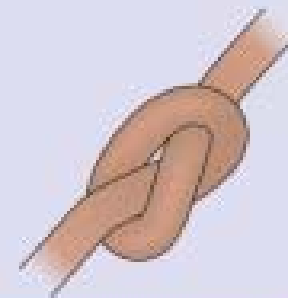
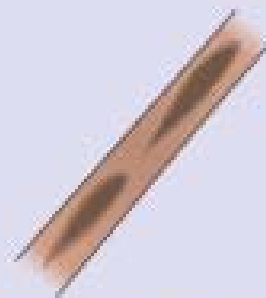
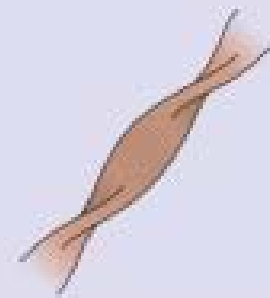
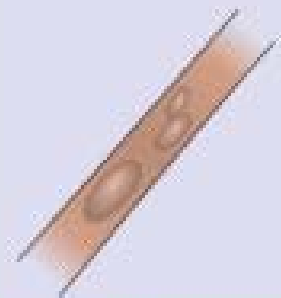
A. Trichorrhexis nodosa

B. Trichorrhexis invaginata

C. Monilethrix

D. Trichoschisis due to trichothiodystrophy (polarization)

E. Trichothiodystrophy (polarization; in comparison to normal hair shaft)



F. Bubble hair

G. Pili torti (scanning EM)

H. Pili annulati

I. Trichonodosis

J. Pili trianguli et canaliculi (scanning EM)

# Trichorrhexis nodosa

- The most common structural hair shaft abnormality
- The affected hair shafts fracture easily at nodal sites
- The splitting into strands produces a microscopic appearance of a pair of brooms stuck together end to end by their bristles.

# Causes of TN

- Most cases are directly related to environmental causes
  - Perming
  - Blow drying
  - Aggressive hair brushing
  - Excessive chemical exposure
  - Scalp pruritis from neurodermatitis, contact dermatitis, and atopic dermatitis

# Other Causes of TN

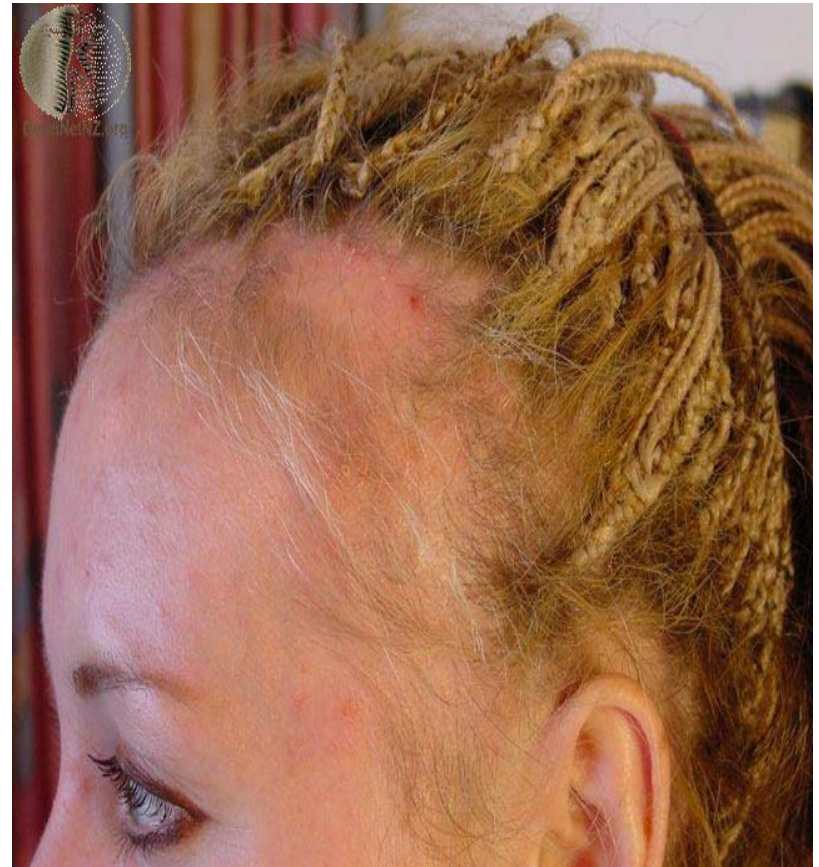
- Underlying disorders such as
  - Argininosuccinicaciduria, Menkes' kinky hair syndrome, Netherton's syndrome, Hypothyroidism, or Trichothiodystrophy



# Treatment of TN

- Medical Care
- Regardless of the presence or the absence of an underlying defect of the hair shaft, trichorrhhexis nodosa is ultimately the result of trauma. Therefore, treatment is aimed at minimizing physical or chemical trauma.
- Excessive brushing, hot combing, permanent waving, and other harsh hair treatments should be avoided.
- In acquired localized trichorrhhexis nodosa, the underlying pruritic dermatosis should be treated to prevent trauma from scratching or rubbing.
- Underlying metabolic disorders are treated accordingly, usually through the implementation of a specifically tailored diet.

# Most Likely Diagnosis Is





# Diagnosis Most Likely Is

- a. Frontal fibrosing alopecia
- b. Alopecia areata
- c. Female patterned alopecia
- d. Traction alopecia
- e. None of the above

# Traction Alopecia

- Traction alopecia is a common cause of hair loss due to pulling forces exerted on the scalp hair.
- This excessive tension leads to breakage in the outermost hairs.
- This condition is seen in children and adults, but it most commonly affects African American women

# Diagnosis of TA

- Diagnosis is via a thorough history taking and meticulous PE
- Hx of tight braids, “pull-back” hairstyle, or chemical straightening suggests dx of TA

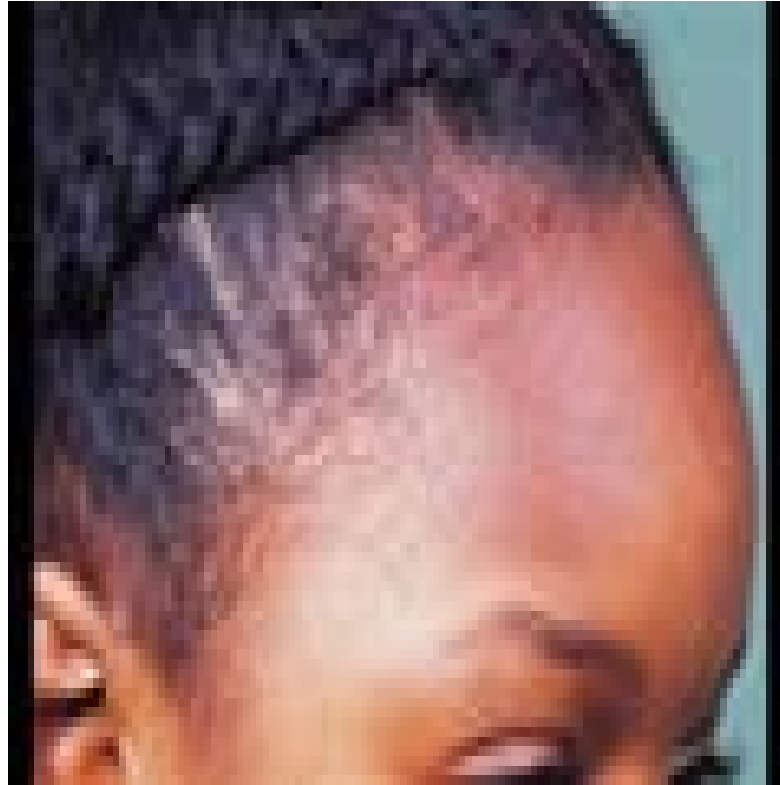
# Treatment of Traction Alopecia

- Change method of hair styling











History of balding occurring over  
many years







# Diagnosis Is ???

May be more than one correct answer.

- A. Alopecia areata
- B. Heavy metal poisoning
- C. Common baldness
- D. Chemotherapy induced hair loss
- E. Androgenizing syndrome

# Male and Female Patterned Alopecia

- Synonyms:
  - Androgenetic alopecia
  - Pattern balding (male and female)
  - Common balding
  - Hereditary balding or thinning



# Key Features

- Genetically determined sensitivity of scalp hair follicles to adult levels of androgens
- Miniaturization of hairs in a symmetric “pattern” on the crown, frontal and vertex regions
- Antiandrogen medications can be used for successful treatment

# Introduction To MPHL AND FPHL

- Common balding is an androgen-dependent hereditary disorder
- More is known about AGA in men than in women
- Frequency increases with age
  - 80% of men by age of 70 show some signs of MPHL
  - Smaller % of women express the trait





I-1



I-2



I-3



I-4



II-1



II-2



III



Advanced

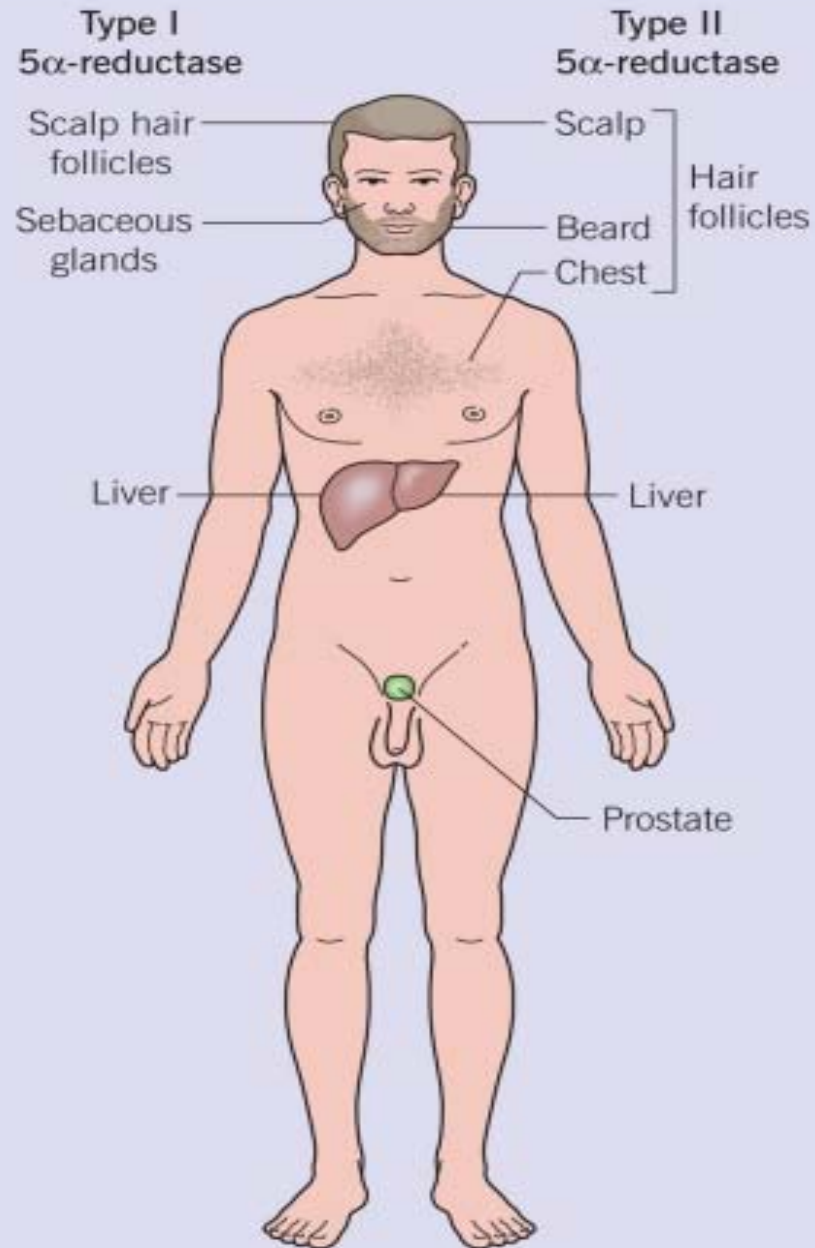


Frontal

# Pathogenesis

- Interplay of genes and hormones
  - Inheritance is almost certainly polygenetic with a genetic input from both parents
    - Strong family history more common in men than women
- The androgen hormones testosterone and dihydrotestosterone (DHT) have selective roles at puberty
- Expression of AGA is particularly related to DHT

## 5 $\alpha$ -REDUCTASE ISOZYME ACTIVITY IN ADULT HUMAN TISSUES



# TREATMENT OF COMMON BALDING





# TREATMENT MPHL

- Topical minoxidil solution or foam (2% and 5%)
  - Finasteride (1mg/day)
    - Caveats: \*5 mg /day associated with high grade prostate cancer in elderly men
- \* 1 mg/day will decrease PSA by 40% in the 40-49 year age group and 50% in the 50-60 age group













Normal hair



Hair loss



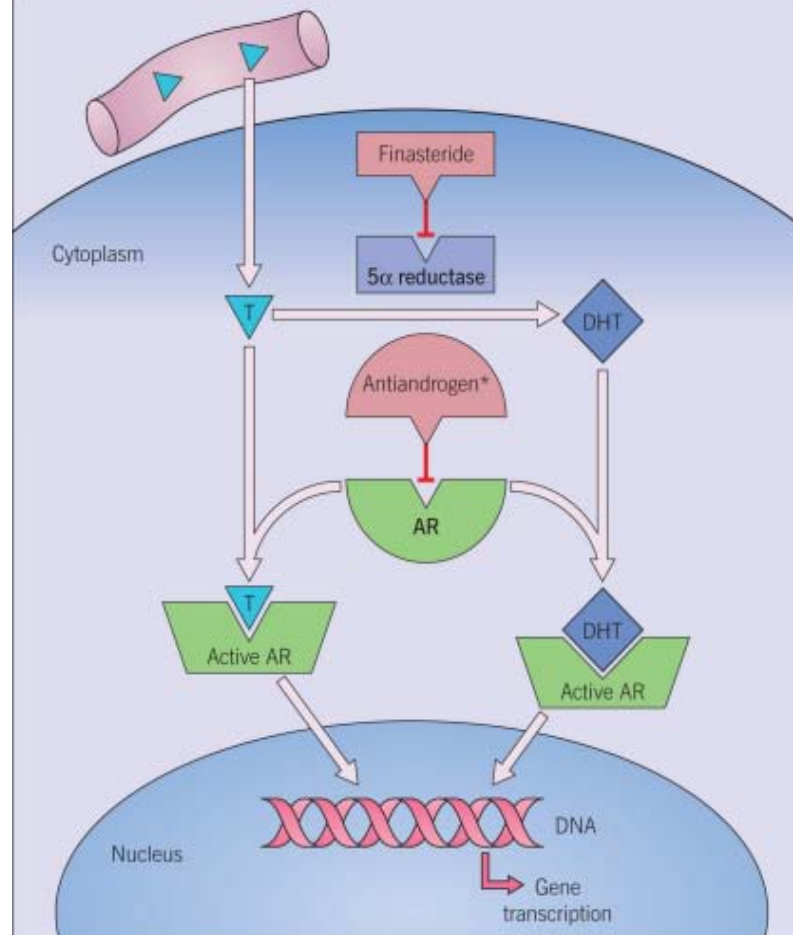


# Treatment of FPHL

- In the US, 2% minoxidil is approved for the management of FPHL (but 5% is oftentimes prescribed).
- FPHL may occur with hyperandrogenemia
  - May benefit from oral contraceptives to suppress ovary androgens, spironolactones, and if appropriate finasteride



## MECHANISM OF ACTION FOR ANTIANDROGENS AND FINASTERIDE



\* e.g. spironolactone, cyproterone acetate, drospirenone, and flutamide

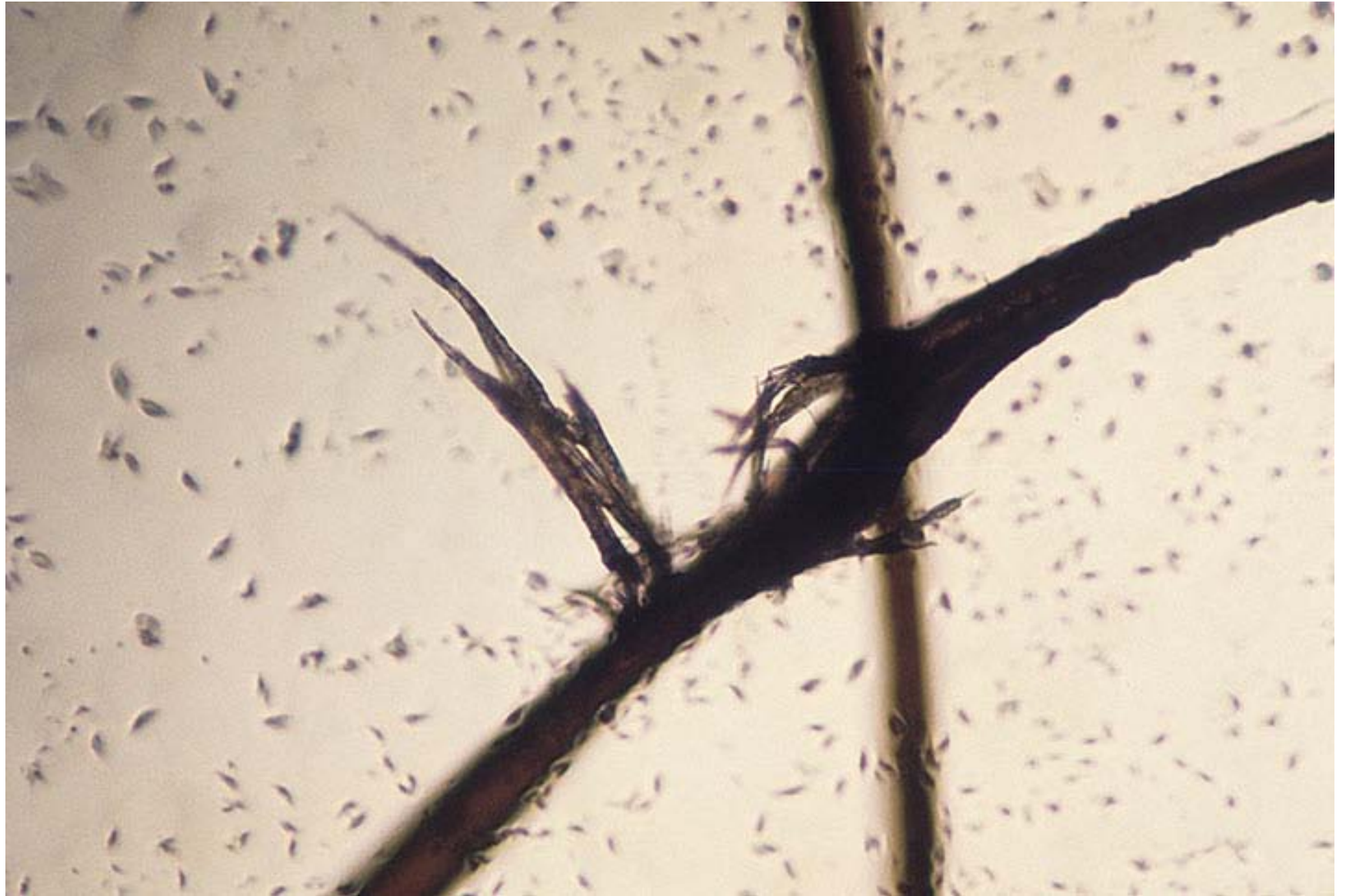
T = testosterone

DHT = dihydrotestosterone

AR = androgen receptor



Chicago Peace  
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I-1



I-2



I-3



I-4



II-1



II-2



III



Advanced



Frontal







## BASIC DATA OF HUMAN HAIR FOLLICLES

Total number	~ 5 000 000 (mostly vellus)
Number of scalp hair follicles	~ 100 000 Blondes: + 20% Redheads: – 20%
Average density (scalp) terminal + vellus	1135/cm <sup>2</sup> (newborn)* 615/cm <sup>2</sup> (20–30 years)* 485/cm <sup>2</sup> (30–50 years)* 435/cm <sup>2</sup> (70–80 years)* African-Americans, Asians: lower density Terminal only: ~ 250/cm <sup>2</sup> Bald scalp (45–70 years): 330/cm <sup>2</sup> * Highest density: cheek + forehead*
Hair embryology	Development progresses at fixed intervals (274–350 µm) in cephalocaudal direction, becoming first visible in eyebrow, upper lip and chin regions (9th week) At 16 weeks, hair shafts are formed in these regions Hair follicles are formed in sequential waves of interspersed follicles
Hair cycle distribution (terminal scalp hair)	Anagen: 85–90% Telogen: 10–15% Catagen: <1%
Duration of hair cycle phases	<div> <div> Anagen: 2–6 years Catagen: 2–3 weeks Telogen: 3 months </div> <div> } Terminal scalp hair </div> </div> <p>There are substantial variations in anagen duration:</p> <ul style="list-style-type: none"> <li>Terminal moustache: 4–14 weeks</li> <li>Terminal arms: 6–12 weeks</li> </ul>









blond lusterless easily epilated  
hair

This healthy 6-year-old boy has a history of increased hair loss since age 2. He was evaluated following an episode when his brother pulled a large clump of hair from the back of the scalp which quickly regrow. Microscopic examination of his hair revealed a baggy stocking sign at the base of each hair.













## CAUSES OF TELOGEN EFFLUVIUM

- Shedding of the newborn (physiologic)
- Postpartum (physiologic)
- Chronic telogen effluvium<sup>29</sup> (no attributable cause or illness)
- Postfebrile (extremely high fevers, e.g. malaria)
- Severe infection
- Severe chronic illness (e.g. HIV disease<sup>30</sup>, systemic lupus erythematosus)
- Severe, prolonged psychological stress
- Postsurgical (implies major surgical procedure)
- Hypothyroidism and other endocrinopathies (e.g. hyperparathyroidism)
- Crash or liquid protein diets; starvation
- Drugs:
  - retinoids (acitretin, isotretinoin)
  - anticoagulants (especially heparin)
  - antithyroid (propylthiouracil, methimazole)
  - anticonvulsants (e.g. phenytoin, valproic acid, carbamazepine)
  - heavy metals
  - $\beta$ -blockers (e.g. propranolol)





Number of lifetime cycles	10–20
Physiologic hair shedding rate (scalp)	~ 100–200/day (substantial interindividual and seasonal variations)
Hair shaft production rate (scalp)	~ 0.35 mm/day, 1 cm/month Hair production is not influenced by cutting/shaving Estrogens reduce hair growth rate Androgens increase hair growth rate and hair diameter in androgen-dependent sites (e.g. beard)
Hair shaft diameter and length	Vellus: <0.03 mm; 1–2 mm Terminal: > 0.06 mm; 1–50 cm Average diameter: Asian hair (circular): 120 $\mu$ m Caucasian (elliptic): 50–90 $\mu$ m
Hair shaft structures	Cuticle (outside), cortex, medulla (center) Cuticle maintains hair fiber integrity Cortex contains bulk of hair keratins and keratin-associated proteins Hair fiber strength is largely due to disulfide bonding Medulla consists of loosely connected trichocytes with large intercellular air spaces; provides insulation (animals)
Hair shaft pigmentation	Dark hair: predominance of eumelanin Blond/red hair: pheomelanin predominates Melanosomes of hair cortex larger than those of epidermis
Hair graying (canities)	Generally commences in the third to fourth decade of life on the temples, spreading later to crown and occiput; by the age of 50 years, 50% of the population has at least 50% grey hair
Hair patterns	Pubic hair: horizontal (90% of women, 20% of men), acuminate (10% of women, 50% of men) Diffuse chest hair: normally grows only in men, after puberty (until 6th decade) Axillary: appears about 2 years after first pubic hairs, more sparse in Mongoloids than Caucasians; frequently absent in older individuals Trichoglyphics: single, clockwise parietal whirl present in 95% of individuals

(\*From Giacometti L. The anatomy of the human scalp. Chapter VI in: Montagna W (ed). Advances in Biology of Skin, Vol VI: Aging. Oxford: Pergamon Press, 1965:97–120.)